Commonwealth of Massachusetts
Executive Office of Energy & Environmental Affairs

Department of Environmental Protection
Central Regional Office • 627 Main Street, Worcester MA 01608 • 508-792-7650

DEVAL L. PATRICK
Governor

RICHARD K. SULLIVAN JR.
Secretary

DAVID W. CASH
Commissioner

April 15 2014

Mr. Joseph Dufresne
Saint-Gobain Abrasives, Inc.
One New Bond Street
Worcester, MA 01606

RE: **Worcester**
Transmittal No.: X258360
Application No.: CE-13-030
Class: OP
FMF No.: 130510
AIR QUALITY PLAN APPROVAL

Dear Mr. Dufresne:

The Massachusetts Department of Environmental Protection ("MassDEP"), Bureau of Waste Prevention, has reviewed your Non-major Comprehensive Plan Application ("Application") listed above. This Application concerns the proposed construction and operation of a new dryer and tunnel kiln and the associated air pollution control equipment used in the production of vitrified grinding wheels in Plant 7 at your manufacturing facility located at One New Bond Street in Worcester, Massachusetts ("Facility"). The Application bears the seal and signature of Charles A. Collet, P.E., Massachusetts Registered Professional Engineer Number 49761.

This Application was submitted in accordance with 310 CMR 7.02 Plan Approval and Emission Limitations as contained in 310 CMR 7.00 "Air Pollution Control" regulations adopted by MassDEP pursuant to the authority granted by Massachusetts General Laws, Chapter 111, Section 142 A-N, Chapter 21C, Section 4 and 6, and Chapter 21E, Section 6. MassDEP's review of your Application has been limited to air pollution control regulation compliance and does not relieve you of the obligation to comply with any other regulatory requirements.

MassDEP has determined that the Application is administratively and technically complete and that the Application is in conformance with the Air Pollution Control regulations and current air pollution control engineering practice, and hereby grants this **Plan Approval** for said Application, as submitted, subject to the conditions listed below.

Please review the entire Plan Approval, as it stipulates the conditions with which the Facility owner/operator ("Permittee") must comply in order for the Facility to be operated in compliance with this Plan Approval.

1. DESCRIPTION OF FACILITY AND APPLICATION

The Saint-Gobain Abrasives, Inc., is an existing facility that manufactures a variety of vitrified abrasives products. The operations occur at multiple buildings throughout the complex.

The Facility proposes to construct and operate a new dryer and tunnel kiln line ("TK-15") to produce the grinding wheels using metallic oxides, silicon oxides, clay, green binders, dextrin, animal glue, ethylene glycol, and walnut shells. Historically, walnut shells have been used in other plants at the Facility and have been the source of odors. Once TK-15 becomes fully operational, the Facility will decommission eight older periodic kilns (EU 207-01 through 207-08) currently operating in Plant 2.

The dryer will be natural gas-fired with a heat input of 1 million British thermal units per hour ("MMBtu/hr") to condition the moisture content and the temperature of the grinding wheels at approximately 100 to 135 degrees Fahrenheit ("ºF") before being placed into the kiln. At this temperature the organic compounds present in the molded wheels do not flash off or volatilize. This uncontrolled exhaust from the dryer is then discharged through its own stack. The kiln will also be natural gas-fired with a heat input of 6.5 MMBtu/hr, and will operate 24 hours a day, 7 days a week. During the firing at the kiln, the grinding wheels are constantly introduced at one end of the kiln and exit the other. The grinding wheels are brought slowly to temperatures approaching 1,823ºF. The kiln opening will be equipped with a booth that has both inner and outer doors and will be maintained under negative pressure. The kiln will also be equipped with a slot hood to keep smoke and odors from being released from the booth when the door is opened and the wheels are introduced into the kiln. The kiln will achieve 100% capture efficiency.

The kiln exhaust will be routed to a regenerative thermal oxidizer ("RTO") to control primarily odor and smoke generated during the firing of the wheels in TK-15. It will also control Volatile Organic Compounds ("VOC") and Hazardous Air Pollutants ("HAPs"). The RTO is a 12,500 standard cubic feet per minute (scfm) Gulf Coast Environmental Model 125 (originally approved for operation at Evergreen Solar, June 2008) equipped with an Eclipse Combustion Model TJ0300 natural gas burner rated at 3 MMBtu/hr. The RTO will maintain a combustion chamber temperature of 1,400ºF and a minimum residence time of 0.17 seconds to achieve emission reductions for particulate matter ("PM") of 95% and for VOC of 98%. The RTO will be installed outside in between Plants 7 and 8. It will be vented to a dedicated stack next to the existing RTO servicing the tunnel kiln TK-14. The kiln will also be equipped with a back-up thermal oxidizer ("TO") that will only be operated when the RTO is not available due to malfunction or maintenance activities. The TO is equipped with a Hauck Manufacturing Model SVG-260-HC natural gas burner rated at 4.7 MMBtu/hr. The TO will maintain a combustion chamber temperature of 1382 ºF and a minimum residence time of 1 second to achieve at least the same emission reduction efficiencies as RTO.

MassDEP has determined that 95% overall control efficiency for PM as defined in Table 2 meets the Best Available Control Technology ("BACT") requirement. The destruction of the low levels of VOC and HAPs is a byproduct of controlling PM and therefore isn't subject to BACT.

2. EMISSION UNIT (EU) IDENTIFICATION

Each Emission Unit (EU) identified in Table 1 is subject to and regulated by this Plan Approval:

Table 1

EU#	Description	Design Capacity	Pollution Control Device (PCD)
TK-15	Dryer	1.0 MMBTU/hr	None
	Tunnel Kiln	6.5 MMBTU/hr	Primary: regenerative thermal oxidizer • 3 MMBTU/hr • minimum temperature at 1400 °F • minimum residence time 0.17 seconds Back-up: thermal oxidizer • 4.7 MMBTU/hr • minimum temperature at 1382 °F • minimum residence time 1 second

Table 1 Key:

EU# = Emission Unit Number
MMBTU/hr = million British thermal units per hour
PCD = Pollution Control Device
°F = Degree Fahrenheit

3. APPLICABLE REQUIREMENTS

A. OPERATIONAL, PRODUCTION and EMISSION LIMITS

The Permittee is subject to, and shall not exceed the Operational, Production, and Emission Limits as contained in Table 2:

Table 2				
EU#	**Operational / Production Limit**	**Air Contaminant**	**Emission Limit**	
TK-15	Capture efficiency for the kiln: 100% thermal oxidizer, is limited to operate up to 876 hours per year	PM[1, 2]	0.22 lb/hr, 0.82 TPY Destruction Efficiency: 95%	
		VOC [1, 2]	0.11 lb/hr, 0.36 TPY	Destruction efficiency: 98%
		Ethylene Glycol (single HAP) [1, 2]	0.020 lb/hr, 0.09 TPY	
		HAPs (total) [1, 2]	0.021 lb/hr, 0.09 TPY	
		NO_x [3]	1.35 lb/hr, 3.99 TPY	
		CO [3]	1.28 lb/hr, 3.93 TPY	
		Opacity	5%	

Notes:

1. The destruction efficiency or an emission rate in lb/hr, whichever is less stringent, shall be met.
2. lb/hr and TPY emission rates shall be calculated based on the emission factors as follows:
   0.53 pounds PM emitted per ton of product. This includes both condensable and non-condensable particulate.
   0.11 pounds VOC emitted per ton of product. This applies for both RTO and TO.
   1.18 pounds Ethylene Glycol maximum usage per hour.
3. The emission factors for NO_x and CO contained in AP-42 Table 1.4-1, External Combustion Sources, are utilized to calculate pollutant emissions associated with the combustion of natural gas associated with TK-15. Annual emissions are based on 8,760 hours of operation per year at the maximum design capacity. There are no controls on these emissions.

Table 2 Key:

EU# = Emission Unit Number
lb/hr = pounds per hour
TPY = tons per consecutive12-month period
NOx = Oxides of Nitrogen
VOC = Volatile Organic Compounds
HAP (single) = maximum single Hazardous Air Pollutant
HAPs (total) = total Hazardous Air Pollutants.
CO = Carbon Monoxide
PM = Particulate Matter having a diameter of 10 microns or less (PM_{10}) and 2.5 microns or less ($PM_{2.5}$). It includes both condensable and non-condensable particulates

B. COMPLIANCE DEMONSTRATION

The Permittee is subject to, and shall comply with, the monitoring, testing, record keeping, and reporting requirements as contained in Tables 3, 4, and 5:

Table 3	
EU#	**Monitoring and Testing Requirements**
TK-15	1. The Permittee shall develop, implement, make available for inspection, and revise, as necessary, a written monitoring plan that includes: a) Procedures for evaluating the performance of the oxidizers. b) Procedures for responding to operating parameter deviations.
	2. Within 180 days of initial operation of the dryer/kiln production line, the Permittee shall perform compliance testing to demonstrate compliance with the emission limits noted in Table 2. The testing shall be conducted while the production line is operating at the maximum processing rate reasonably expected to occur; and the test scheduled on a date mutually agreed upon with MassDEP. The testing shall include: a) Stack testing of PM, VOC, Ethylene Glycol, and total HAPs on the regenerative thermal oxidizer, thermal oxidizer and the dryer. b) Capture efficiency testing for kiln c) Noise compliance survey
	3. Subsequent to the initial compliance demonstration, the Permittee shall conduct compliance emissions testing of the RTO following process/product changes that could increase emissions from the production line.
	4. Compliance with the allowable opacity limits shall be determined in accordance with EPA Method 9, as specified in 40 CFR 60, Appendix A.
	5. The combustion chamber temperature in the oxidizers shall be monitored and recorded continuously whenever the kiln production line is operational.
	6. The thermocouple, temperature digital monitor, audible and visible alarm system, and programmable logic control shall be in an accurate operating condition at all times.
	7. Product throughput should be monitored sufficiently to demonstrate compliance with emission limits noted in Table 2.
	8. The Permittee shall identify the worst case emission scenario, correlate the emission rates with the production output, and incorporate that into the protocol of the compliance testing.
Facility-wide	9. The Permittee shall monitor all operations to ensure sufficient information is available to comply with 310 CMR 7.12 Source Registration.
	10. If and when MassDEP requires it, the Permittee shall conduct emission testing in accordance with USEPA Reference Test Methods and Regulation 310 CMR 7.13.

Table 3 Key:

EU# = Emission Unit Number
CMR = Code of Mass. Regulations
USEPA = United States Environmental Protection Agency
HAPs (total) = total Hazardous Air Pollutants
RTO = regenerative thermal oxidizer
TO = thermal oxidizer
Oxidizers = RTO/TO
VOC = Volatile Organic Compounds

PM = Particulate Matter having a diameter of 10 microns or less (PM_{10}) and 2.5 microns or less ($PM_{2.5}$). It includes both condensable and non-condensable particulates

Table 4

EU#	Record Keeping Requirements
TK-15	1. The Permittee shall maintain monthly records of wheel production and usage of ethylene glycol for TK-15.
	2. The Permittee shall maintain records of the hours of operation of the RTO and the TO.
Facility-wide	3. The Permittee shall maintain adequate records on-site to demonstrate compliance status with all operational, production, and emission limits contained in Table 2 above. Records shall also include the actual emissions of air contaminant(s) emitted for each calendar month and for each consecutive twelve-month period (current month plus prior eleven months). These records shall be compiled no later than the 15th day following each month. An electronic version of the MassDEP approved record keeping form, in Microsoft Excel format, can be downloaded at http://www.mass.gov/eea/agencies/massdep/air/approvals/limited-emissions-record-keeping-and-reporting.html#WorkbookforReportingOn-SiteRecordKeeping.
	4. The Permittee shall maintain records of monitoring and testing as required by Table 3.
	5. The Permittee shall maintain a copy of this Plan Approval, underlying Application and the most up-to-date SOMP for the EU and PCDs approved herein on-site.
	6. The Permittee shall maintain a record of routine maintenance activities performed on the approved EU, PCDs and monitoring equipment. The records shall include, at a minimum, the type or a description of the maintenance performed and the date and time the work was completed.
	7. The Permittee shall maintain a record of all malfunctions affecting air contaminant emission rates on the approved EU, PCDs and monitoring equipment. At a minimum, the records shall include: date and time the malfunction occurred; description of the malfunction; corrective actions taken; the date and time corrective actions were initiated and completed; and the date and time emission rates and monitoring equipment returned to compliant operation.
	8. The Permittee shall maintain records to ensure sufficient information is available to comply with 310 CMR 7.12 Source Registration.
	9. The Permittee shall maintain records required by this Plan Approval on-site for a minimum of five (5) years.
	10. The Permittee shall make records required by this Plan Approval available to MassDEP and USEPA personnel upon request.

Table 4 Key:

EU# = Emission Unit Number
CMR = Code of Mass. Regulations
RTO = regenerative thermal oxidizer
TO = thermal oxidizer
PCD = Pollution Control Device
USEPA = United States Environmental Protection Agency
SOMP = Standard Operating and Maintenance Procedure

Table 5	
EU#	**Reporting Requirements**
TK-15	1. The Permittee shall notify the MassDEP in writing within 60 days when the dryer and tunnel kiln line, the oxidizers and associated ductwork are installed and deemed operational.
	2. The Permittee shall notify the MassDEP in writing of scheduled stack testing at least 21 days prior to testing so that MassDEP personnel may witness the test.
Facility-wide	3. The Permittee shall submit to MassDEP all information required by this Plan Approval over the signature of a "Responsible Official" as defined in 310 CMR 7.00 and shall include the Certification statement as provided in 310 CMR 7.01(2)(c).
	4. The Permittee shall notify the Central Regional Office of MassDEP, BWP Permit Chief by telephone: 508-767-2845, email: CERO.Air@massmail.state.ma.us, or fax : 508-792-7621, as soon as possible, but no later than one (1) business day after discovery of an exceedance(s) of Table 2 requirements. A written report shall be submitted to Permit Chief at MassDEP within three (3) business days thereafter and shall include: identification of exceedance(s), duration of exceedance(s), reason for the exceedance(s), corrective actions taken, and action plan to prevent future exceedance(s).
	5. The Permittee shall report annually to MassDEP, in accordance with 310 CMR 7.12, all information as required by the Source Registration/Emission Statement Form. The Permittee shall note therein any minor changes (under 310 CMR 7.02(2)(e), 7.03, 7.26, etc.), which did not require Plan Approval.
	6. The Permittee shall provide a copy to MassDEP of any record required to be maintained by this Plan Approval within 30 days from MassDEP's written request.
	7. The Permittee shall submit to MassDEP for approval a protocol, at least 30 days prior to emission testing, for emission testing as defined in Table 3 Monitoring and Testing Requirements. a) Stack testing of the regenerative thermal oxidizer, thermal oxidizer and the dryer b) Capture efficiency testing for the kiln c) Noise compliance survey
	8. The Permittee shall submit to MassDEP a final test results report, within 45 days after emission testing, for emission testing as defined in Table 3 Monitoring and Testing Requirements. a) Stack testing of the regenerative thermal oxidizer, thermal oxidizer, and the dryer b) Capture efficiency testing for the kiln c) Noise compliance survey

Table 5 Key:
EU# = Emission Unit Number CMR = Code of Mass. Regulations

4. SPECIAL TERMS AND CONDITIONS

A. The Permittee is subject to, and shall comply with, the Special Terms and Conditions as contained in Table 6 below:

Table 6	
EU#	**Special Terms and Conditions**
TK-15	1. The Permittee shall maintain the one hour block average operating temperature in the oxidizer chamber combustion at or above the minimum allowable operating temperature for the oxidizers whenever the dryer and tunnel kiln line is operational, or the temperature established at the most recent compliance stack testing (utilizing EPA approved methods) that verifies compliance with the emission limits noted in Table 2. a) minimum temperature for the regenerative thermal oxidizer at 1400ºF b) minimum temperature for the thermal oxidizer at 1382ºF
	2. The Permittee shall conduct annual burner inspection to maintain proper burner operation and efficiency of the oxidizers.
	3. The Permittee shall operate the dryer, the kiln, the RTO and /or the TO in accordance with the manufacturer's standard operating procedures, and shall perform the preventive maintenance evaluation of oxidizers at least annually.
	4. The Permittee shall utilize only natural gas with the dryer, the kiln, the RTO and /or the TO.
	5. The Permittee shall operate the oxidizer(s) at all times when the tunnel kiln is in operation and shall not be bypassed at any time.
	6. The Permittee shall not conduct a burnout of the RTO.
	7. Upon start-up, product may not be introduced into the kiln until the oxidizer reaches optimum temperature. During kiln start-up, only pre-fired wheels that will not have any emissions will be used prior to the oxidizer reaching optimum temperature.
	8. In the event of an RTO failure, an interlock shall start the TO and divert the tunnel kiln exhaust to the TO.
	9. For scheduled maintenance of the RTO, the TO shall be brought up to optimum temperature before the exhaust is diverted from the RTO to the TO.
	10. The Permittee shall minimize the emissions and the time period during transition from the RTO to the TO.
	11. The Permittee shall conduct maintenance checks on RTO and TO according to manufacturer requirements and the SOMPs.
Facility-wide	12. Any prior Plan Approvals issued under 310 CMR 7.02 shall remain in effect unless specifically changed or superseded by this Plan Approval. The Facility shall not exceed the emission limits and shall comply with approved conditions specified in the prior Plan Approval(s) unless specifically altered by this Plan Approval.

Table 6 Key:
EU# = Emission Unit Number RTO = regenerative thermal oxidizer

°F = Degree Fahrenheit
CMR = Code of Mass. Regulations
SOMP = Standard Operating and Maintenance Procedure
TO = thermal oxidizer
Oxidizers = RTO/TO

B. The Permittee shall install and use an exhaust stack, as required in Table 7, on each of the Emission Units that is consistent with good air pollution control engineering practice and that discharges so as to not cause or contribute to a condition of air pollution. Each exhaust stack shall be configured to discharge the gases vertically and shall not be equipped with any part or device that restricts the vertical exhaust flow of the emitted gases, including but not limited to rain protection devices known as "shanty caps" and "egg beaters."

C. The Permittee shall install and utilize exhaust stacks with the following parameters, as contained in Table 7, for the Emission Units that are regulated by this Plan Approval:

Table 7

EU#		Stack Height Above Ground (feet)	Stack Inside Exit Dimensions (feet)	Stack Gas Exit Velocity Range (feet per second)	Stack Gas Exit Temperature Range (°F)
TK-15	TK1501	36	2.17	33.9	290 - 320
	TK1502	29	2.33	66.4	1300 - 1385

Table 7 Key:
EU# = Emission Unit Number
TK1501 = Stack for regenerative thermal oxidizer
°F = Degree Fahrenheit
TK1502 = Stack for thermal oxidizer

5. GENERAL CONDITIONS

The Permittee is subject to, and shall comply with, the following general conditions:

A. Pursuant to 310 CMR 7.01, 7.02, 7.09 and 7.10, should any nuisance condition(s), including but not limited to smoke, dust, odor or noise, occur as the result of the operation of the Facility, then the Permittee shall immediately take appropriate steps including shutdown, if necessary, to abate said nuisance condition(s).

B. If asbestos remediation/removal will occur as a result of the approved construction, reconstruction, or alteration of this Facility, the Permittee shall ensure that all removal/remediation of asbestos shall be done in accordance with 310 CMR 7.15 in its entirety and 310 CMR 4.00.

C. If construction or demolition of an industrial, commercial or institutional building will occur as a result of the approved construction, reconstruction, or alteration of this Facility, the Permittee shall ensure that said construction or demolition shall be done in accordance with 310 CMR 7.09(2) and 310 CMR 4.00.

D. Pursuant to 310 CMR 7.01(2)(b) and 7.02(7)(b), the Permittee shall allow MassDEP and / or USEPA personnel access to the Facility, buildings, and all pertinent records for the purpose of making inspections and surveys, collecting samples, obtaining data, and reviewing records.

E. This Plan Approval does not negate the responsibility of the Permittee to comply with any other applicable Federal, State, or local regulations now or in the future.

F. Should there be any differences between the Application and this Plan Approval, the Plan Approval shall govern.

G. Pursuant to 310 CMR 7.02(3)(k), MassDEP may revoke this Plan Approval if the construction work is not commenced within two years from the date of issuance of this Plan Approval, or if the construction work is suspended for one year or more.

H. This Plan Approval may be suspended, modified, or revoked by MassDEP if MassDEP determines that any condition or part of this Plan Approval is being violated.

I. This Plan Approval may be modified or amended when in the opinion of MassDEP such is necessary or appropriate to clarify the Plan Approval conditions or after consideration of a written request by the Permittee to amend the Plan Approval conditions.

J. Pursuant to 310 CMR 7.01(3) and 7.02(3)(f), the Permittee shall comply with all conditions contained in this Plan Approval. Should there be any differences between provisions contained in the General Conditions and provisions contained elsewhere in the Plan Approval, the latter shall govern.

6. MASSACHUSETTS ENVIRONMENTAL POLICY ACT

MassDEP has determined that the filing of an Environmental Notification Form (ENF) with the Secretary of Energy & Environmental Affairs, for air quality control purposes, was not required prior to this action by MassDEP. Notwithstanding this determination, the Massachusetts Environmental Policy Act (MEPA) and 301 CMR 11.00, Section 11.04, provide certain "Fail-Safe Provisions," which allow the Secretary to require the filing of an ENF and/or an Environmental Impact Report (EIR) at a later time.

7. APPEAL PROCESS

This Plan Approval is an action of MassDEP. If you are aggrieved by this action, you may request an adjudicatory hearing. A request for a hearing must be made in writing and postmarked within twenty-one (21) days of the date of issuance of this Plan Approval.

Under 310 CMR 1.01(6)(b), the request must state clearly and concisely the facts, which are the grounds for the request, and the relief sought. Additionally, the request must state why the Plan Approval is not consistent with applicable laws and regulations.

The hearing request along with a valid check payable to the Commonwealth of Massachusetts in the amount of one hundred dollars ($100.00) must be mailed to:

Commonwealth of Massachusetts
Department of Environmental Protection
P.O. Box 4062
Boston, MA 02211

This request will be dismissed if the filing fee is not paid, unless the appellant is exempt or granted a waiver as described below. The filing fee is not required if the appellant is a city or town (or municipal agency), county, or district of the Commonwealth of Massachusetts, or a municipal housing authority.

MassDEP may waive the adjudicatory hearing-filing fee for a person who shows that paying the fee will create an undue financial hardship. A person seeking a waiver must file, together with the hearing request as provided above, an affidavit setting forth the facts believed to support the claim of undue financial hardship.

Enclosed is a stamped approved copy of the application submittal.

Should you have any questions concerning this Plan Approval, please contact Hui Liang at 508-767-2762, or in writing at the letterhead address.

This final document copy is being provided to you electronically by the Department of Environmental Protection. A signed copy of this document is on file at the DEP office listed on the letterhead.

Roseanna E. Stanley
Acting Permit Chief
Bureau of Waste Prevention

Enclosure

ecc: Worcester Department of Inspectional Services
MassDEP/Boston – Yi Tian
MassDEP/Boston – Kim McCoy

Lysa Modica – AMEC